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# negotiating gender at University STEM study programmes

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*Publication date:*
2015

*Document version*
Peer reviewed version

# Finding a way to belong: negotiating Gender at University STEM study programmes

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Paper presented at the NARST 2015 Conference, Chicago, IL, USA

*Citation for published version:*

Madsen, L.M., Holmegaard, H.T. and Ulriksen, L. (2015): Finding a way to belong: negotiating gender at university STEM study programmes. Abstract from NARST, Chicago, IL, United States.

**Finding a way to belong: Negotiating gender at university STEM study programmes**

## Subject/problem

In recent years the literature within science education has been inspired by feminist theories led by Judith Butler (1993) to address gender as something students *perform* through culture (Archer, DeWitt, & Willis, 2014; Sinnes & Løken, 2012). As a consequence, research challenges the assumptions that men and boys, and women and girls, belong to homogeneous groups, who are masculine and feminine in one particular way that is shared by either men or women (Gilbert & Calvert, 2003; Henwood, 1998). Rather it is suggested that research should approach gender as a complex category in which students position themselves (Davies & Harré, 1990) and that the way students position themselves changes in accordance to the cultural context and social relations they participate in (Hasse, 2008). Based on these approaches it becomes not only important to study female students that traditional have been in focus when addressing the issue of gender within science but also to study the negotiations and integration of male students.

Research has shown that being a student within science influences the ways of getting recognized within the study programme and how gender must be negotiated in order to be accepted. Gonsalves (2010) shows how women in doctoral physics programmes position femininity as something outside of physics, and themselves as 'tomboys' to belong to physics. Also Due (2012) points at two competing discourses in physics which sets the scene for students' available positions; one highlights physics as a masculine discipline, and the other physics as a gender neutral discipline. A similar conclusion is found by Hughes (2001) that finds a narrow range of gendered student science subjectivities available for students in physical science (Hughes, 2001). These documented perceptions, in different ways, set the scene for gendered ways of being recognized as a proper student within STEM educational programmes.

To change students' access to science whatever way they perform gender we must therefore study how science culture includes certain ways of doing gender while excluding others.
In this paper we do this by exploring how students being the minority either female or male within a STEM higher education programme negotiate their gender in order to get social and academic accepted.

## Design/procedure

Three higher education study-programs at two research intensive universities in Denmark have been selected based on information about the gender distribution of female and male students. These are: Computer science, molecular biomedicine and physics & nanotechnology. Computer science has a low number of female students (between 4-9% in the period 2009-2011). Also physics & nanotechnology has a low number of female students (4-25% in the period of 2008-2010) whereas molecular biomedicine contrary has a low number of male students (13-24% males from 2009-2011).

We have applied a multi-method triangulation design where different types of information are obtained about the same theme with different methods in order to obtain an in-depth understanding (Denzin & Lincoln, 2000). In the triangulation we designed writing exercises, group work and qualitative interviews.

In the writing exercises the students were encouraged to write down their reasons for choosing the particular study programme they were enrolled in, and their experiences being in the study programme' (40 written descriptions were obtained). These essays were a way to gain access to the students' individual considerations. In the group work the students were asked individually to make a list of themes they considered important for a student to successfully get through the first year at university. Secondly, within groups of peers they were asked to prioritize the themes. This exercise was used to provide insights into the (gendered) negotiations among students about the themes. The group work was video recorded. We held 8 work-shops with 41 participating students. Qualitative individual and group interviews were held; firstly to unfold the students' narratives of entering the selected educational programs and their experiences during the first year, secondly to gain in-sight into how the students integration-strategies and how to negotiate gender. 12 qualitative interviews were carried out involving 31 students, consisting of 5 individual and 7 group interviews. All data was collected in accordance with the Danish Data Protection Agency. The data was analysed from a thematic analytic approach (Braun & Clarke, 2006).

## Findings and analysis

### *How to become a computer science student when being the minority of girls*

In the data-material we found no homogeneous portrays of what a computer science student is, as there exist parallel subcultures in where different student strategies are recognised. The students described an array of positions of how to become a proper computer science student and how the minority of female students got integrated into the study programme. When asked directly most students found no differences between female and male students' and the challenges they meet during first year. However when diving into the students' narratives, a more complex picture appears. In particular two themes emerge from the thematic analysis; the jargon and learning strategies. As we will show each interact differently with doing gender as a computer science student. Firstly, positioning yourself as a computer science student has to do with using a particular vocabulary that is described as technical terms used to exclude students who are not familiar with the rhetoric:

> *'The way you speak to each other; the content, the terminology, the way of competing is very excluding. Girls get frightened about it – and it's hard to get into it (…) But very identity-building (…) I think [the jargon] is unpleasant for other girls, and they feel more stupid than they necessarily are. That's part of the game, to make people who do not know it [the jargon] feel stupid' (Emily)*

The computer science students point at a particular technical jargon as a way to position oneself as a serious and clever student. This technical jargon is described as gendered in several ways. First of all some of the computer science girls did not apply to computer science due to their interest in the technical aspects of the programme, and do not have a long history of coding experience before entering the programme as some of the boys. Second having neither the interest nor the prerequisites for applying it, can reinforcing a sense of being stupid as Emily described above as a way to underestimate own abilities. This is related to the second theme, namely that the social learning strategies that in particular some of the girls apply, are not supported by the study programme. One student explain how discussing an assignment with peers or asking the teacher before having tried out <u>all</u> solutions by yourself is risky as there is a danger of getting positioned as un-intelligent, and as a girl you might feel that you enhance the

picture of 'girls cannot do computer science'. And a large part of the culture at computer science has to do with being intelligent: *if you are smart you are recognized no matter how you behave.* An example of how individual learning strategies are supported in favor of more social ones, are an assignment in where the students are asked to: *play with it, take it home with you…you will figure it out'*. This 'take it home and play with it' presupposes that the students by themselves find not only the solution but also learn different ways of getting to it and are motivated by solving open problems as kind of lonely detectives. Emily's description of the learning culture at computer science is supported within the literature. In physics, Hasse (2002) describes how girls in physics are confused because they did NOT (like they were used to from school) get credit for "following the instructions". Rather what was recognized was being playful and trying out own ideas. The analysis show how Computer science presupposes gendered experiences and practices that do not necessary reflect competences but different ways of studying.

***How to become a Physics & nanotechnology student when being the minority of girls***

A general narrative at Physics & nanotechnology was how being a physicist was not alienable with performing femininity. As a consequence female student must strive to become one of the boys to fit into the study programme:

> *'I think they easily become one of the boys – they need to adjust when there is such a huge [gender imbalance] it's going to be a male culture' [no matter what] (Allan).*

Physics & nanotechnology is described as a place with a high level and pace, that requires of the students to be 'in love' with physics to get through, and to be 'one of the boys'. This study culture set the scene for students to perform their gender in particular ways to gain recognition as physicists. If one of the male students faces difficulties in keeping the pace, he can still gain recognition from fellow students if he involves himself in the social part of the study programme. On the contrary, if a female student does not keep the pace, it seems incompatible with being '*one of the boys*', her only way to stay at the study programme is to be good looking. Good looking, though, is not being related to 'being one of the boys' but it is a way to gain social inclusion if becoming 'one of the boys doesn't work'. To become 'one of the boys' includes downplaying a feminine physical appearance and a desire to 'be one of the boys' therefore has consequences for the female students. Louise explains how she does not have any relationship to the other girls at the study programme at all, but belongs to a group of male students – a group that was set down by the institution in the beginning of first year, which they have maintained. Also the jargon is described as more direct and sometime harsh.

Danielsson (2009) finds how female physicists balance the norms for what being a women and being a physicists are by positioning themselves as different from other women. This is the exact case when Olga in our material explain how the teaching sometimes particular presupposes male students:

> Olga: *'We watched Myths Busters [science programme at Discovery] in one of the lectures and then our teacher had found some mistakes in the programme which we should identity. And then, I don't know, it became very boyish like 'girls cannot do this'…and then we thought 'yes we can, we are actually some right here''*
> Interviewer: *'How do you experience it when such things happen?'*
> Olga: *'I think it is the other girls, not me I do not take it on me, as it is me'*

In a study of students in the social sciences Søndergaard (1996) shows how academic prestige is linked to masculinity. She uses the concept of a matrix to discuss different ways of relating, ways

of acting and interacting, but also academic preferences and competence. When academic competences are related to masculinity it does not mean that men necessarily are conceived of as competent. Competence is related to the matrix, and this means that male students have a more immediate access to being recognised by the environment as competent, because they carry the sign on the body that through the matrix is connected with academic competence. Female students can be recognised as competent as well, but they have to show or act their competence more explicitly because they are not linked to it through the matrix.

***How to become a Molecular biomedicine student being the minority of boys***

The students' description of being a male student at molecular biomedicine is opposite to that of being a female physics student. Here the male students are expected to be different from the girls both academically and socially. They are expected to have a need of hanging out with other male students, being high shouting, informal and spontaneous. These expectations have some consequences for how male students are positioned and position themselves. One is that they meet in a lodge for male students only:

> Will: *'We were to this lodge inauguration with drinking, different games - really masculine, like be in sauna and drink booze and then out running naked around'*
> Peter: *'It is also a kind of natural isn't it - when we are boys we need to find some way to stick together'*

Being together with other male students is described as preferable for the male students at molecular biomedicine, and as a result it is possible to 'hang out with girls' but becoming one of the girls is not perceived as an available or attractive position. Being together with the boys is described as a relief. As the male students at molecular biomedicine are expected to be 'high shouting' and attractive company, they are also expected to find socializing easy. One male student explains how he actually found it hard to enter a class in the beginning afraid of not being able to chat with fellow female students. This expectation also affects the academic positions. Female students are described as well organized, with high self-discipline and work ethic, and the study programme as a high performance culture, but it seems as the male students' performance does not have to be as active: '*We do not show in class that we are wise although we are'* [like the women tend to do according to the interviewed men] and '*we do not need to have everything under control'*. They do not find it necessary to be in control to position them as clever to get recognized as they describe they girls do.

The male students at molecular biomedicine are perceived as something different from the majority of girls. In one perspective the males at Molecular biomedicine are given room to be a Molecular biomedicine student in different ways than the majority within the study programme. In another way they are expected to be different from the majority of girls in specific ways. In that perspective it seems as the male students need to adapt a segregation strategy to be academic and social accepted.

## Conclusion

The present analysis has shown that both minority male and minority female students need to engage in particular narrow gendered identity negotiation-processes to become socially and academically integrated into their STEM study programme. To do this the students apply different gendered strategies; ranging from striving to become like the majority by assimilation to explicitly maintaining one's differences by segregation. Also the study has shown how the culture of teaching and perception of knowledge at the study programmes interacts with the

students negotiations of identity in gendered ways. Is seems as because academic competences are connoted as masculine the female students are more in danger of being excluded as not clever enough than the male students in STEM university study programmes. Finally, the study shows the huge variation of gender related issues within the different STEM disciplines often overlooked when addressing issues of gender within STEM in general.

**Contribution to the teaching and learning of Science**

The paper adds to the understanding of both female and male students' access to and possibility for completing a higher education within the STEM. It points to the significance of culture, teaching and learning practice of the specific study programme for both their academic and social integration.

**How the paper will contribute to the interests of NARST members**

The presented study will add to the society's knowledge of the importance of addressing gender when trying to understand the academic and social integration of students entering higher education. It will be of interest of all NARST members working with first year students, gender equity and diversity studies as well as members interested in retention and dropouts from science.

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